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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,355	03/25/2004	Lee Bindeman	LSTC-003	1255
37804	7590	04/10/2007	EXAMINER	
ROGER H. CHU			HSIEH, BRANDON	
19499 ERIC DRIVE				
SARATOGA, CA 95070				
			ART UNIT	PAPER NUMBER
			2128	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/10/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/810,355

Applicant(s)

BINDEMAN, LEE

Examiner

Brandon Hsieh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 06/21/2004.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figures 1A, 1B, 2A, 2B, 5A-5H and FIG. 6 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-15 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: a step for controlling hourglass deformations of a solid element in finite element analysis.

Claim Rejections - 35 USC § 101

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3.1 ¹⁻¹⁵ Claims ~~6-10~~ are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

3.2 Consider claims 1-5 and 11-15, analysis of the claims indicates that the claimed invention fails to produce a concrete result and steps are merely series of act, which fails to produce a tangible result which enables any usefulness to be realized.

3.3 Consider claims 6-10, the Examiner submits that the system claims, as written, are merely drawn to nonstatutory descriptive material since claimed "A software product" appears to be an apparatus claim that consists only of software program elements (i.e. program per se) because claimed system does not impart any functionality as being employed as a computer component. That is, as currently drafted, the claims recite only software elements for translating instructions but no actual supporting hardware. Further, the specification does not appear to set forth that claimed "product" consists of anything other than simply software elements. Only code or instructions implement the processes of the claimed invention (specification [0060]).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 6, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Nagtegaal (U.S. Patent 6,044,210).

Consider claim 1, Nagtegaal discloses a method for controlling hourglass deformations of a solid element in finite element analysis, the method comprising:

establishing an initial element coordinate system of the solid element for an initial undeformed geometry of the solid element (FIG. 1A-D, tetrahedral elements, col. 5 lines 41-49);

establishing a current element coordinate system of the solid element for a current deformed geometry of the solid element (col. 7 lines 54-64, constrained coordinates where using coordinate of nodes to define element coordinates);

calculating a set of initial nodal coordinates of the solid element in the initial element coordinate system (FIG. 1, 4, element divided into structure of nodes, initial coordinate of nodes, col. 6 lines 65-67);

calculating a set of current nodal coordinates of the solid element in the current element coordinate system (col. 7 lines 54-64, constrained coordinates of nodes);

evaluating a set of hourglass shape vectors of the solid element from the initial nodal coordinates (hourglass vector, FIG. 10, S70); and

calculating a set of hourglass deformation magnitudes of the solid element (hourglass strain, FIG. 10, S72) from the hourglass shape vectors the initial nodal coordinates and the current nodal coordinates.

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Consider claim 6, Nagtegaal discloses a software product (col. 4 lines 64-66) to be executable in a computing device (FIG. 11) for controlling hourglass deformations of a solid element in finite element analysis, the software product comprising:

program code for establishing an initial element coordinate system of the solid element for an initial undeformed geometry of the solid element (FIG. 1A-D, tetrahedral elements, col. 5 lines 41-49);

program code for establishing a current element coordinate system of the solid element for a current deformed geometry of the solid element (col. 7 lines 54-64, constrained coordinates where using coordinate of nodes to define element coordinates);

program code for calculating a set of initial nodal coordinates of the solid element in the initial element coordinate system (FIG. 1, 4, element divided into structure of nodes, initial coordinate of nodes, col. 6 lines 65-67);

program code for calculating a set of current nodal coordinates of the solid element in the current element coordinate system (col. 7 lines 54-64, constrained coordinates of nodes);

program code for evaluating a set of hourglass shape vectors of the solid element from the initial nodal coordinates (hourglass vector, FIG. 10, S70); and

program code for calculating a set of hourglass deformation magnitudes of the solid element (hourglass strain, FIG. 10, S72) from the hourglass shape vectors, the initial nodal coordinates and the current nodal coordinates.

Consider claim 11, Nagtegaal discloses a machine-readable medium (FIG. 13) embodying instructions (col. 4 lines 64-66) for execution by a processor (FIG. 12, CPU 250), the instructions, when executed by the processor, causing the processor to perform a method for controlling hourglass deformations of a solid element in finite element analysis, the method comprising:

- establishing an initial element coordinate system of the solid element for an initial undeformed geometry of the solid element (FIG. 1A-D, tetrahedral elements, col. 5 lines 41-49);

- establishing a current element coordinate system of the solid element for a current deformed geometry of the solid element (col. 7 lines 54-64, constrained coordinates where using coordinate of nodes to define element coordinates);

- calculating a set of initial nodal coordinates of the solid element in the initial element coordinate system (FIG. 1, 4, element divided into structure of nodes, initial coordinate of nodes, col. 6 lines 65-67);

- calculating a set of current nodal coordinates of the solid element in the current element coordinate system (col. 7 lines 54-64, constrained coordinates of nodes);

- evaluating a set of hourglass shape vectors of the solid element from the initial nodal coordinates (hourglass vector, FIG. 10, S70); and

- calculating a set of hourglass deformation magnitudes of the solid element (hourglass strain, FIG. 10, S72) from the hourglass shape vectors, the initial nodal coordinates and the current nodal coordinates.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 7, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagtegaal (U.S. Patent 6,044,210) in view of Forssell et al. ("Creating a New Element Type",

http://web.archive.org/web/20030214185408/http://impact.sourceforge.net/Manual_Programmers/Element.html)

Consider claim 2, 7 and 12, Nagtegaal discloses the method of claim 1, a software product of claim 6, and the machine-readable medium of claim 11.

Nagtegaal also discloses a method and program code for evaluating a set of generalized hourglass forces (hourglass force, S74, FIG. 10) from the hourglass deformation magnitudes, the initial nodal coordinates, and material constants of the solid element (D material moduli, col. 9 line 61) and;

calculating a set of nodal forces (hourglass force vector, S78, FIG. 10) in the current element coordinate system from the generalized hourglass forces and the hourglass shape vectors;

Nagtegaal fails to disclose calculating transforming the set of nodal forces from the current element coordinate system to global coordinate system before adding to global force array.

Forssell et al. discloses calculating nodal forces (P. 5 "calculate Nodal Forces") and transform to global coordinate system before adding to the node (P. 4. "this is needs to be calculated in three dimensions and then transformed to the global xyz coordinate system before adding it to the node", P.5 "...transforming this force to global coordinates...", "add this force contribution to the nodes").

Nagtegaal and Forssell et al. are analogous art because they are both related to finite element simulation (Forssell et al., P.1).

Therefore, it would be have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the force transformation to global coordinate as taught by Forssell et al. for the method of controlling hourglass deformation of Nagtegaal, for the benefit of calculating and adding the element internal forces to the nodes (P. 5, steps of calculating and adding forces to the nodes).

Claims 3-4, 8-9, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagtegaal (U.S. Patent 6,044,210) in view of Belytschko ("Element Technology" <http://www.tam.northwestern.edu/tb/Book/Chapter%208.pdf>).

Consider claim 3, 8 and 13, Nagtegaal discloses the method of claim 1, a software product of claim 6, and the machine-readable medium of claim 11.

Nagtegaal fails to calculate all terms of an element stabilization matrix for the solid element from the hourglass shape vectors, the initial nodal coordinates, and material constants of the solid element.

Belytschko discloses calculating all terms of an element stabilization matrix (P. 34, equation (1.3.21c) for the solid element from the hourglass shape vectors (B matrix

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P. 34), the initial nodal coordinates (B matrix is derived from nodal coordinates) , and material constants of the solid element (constants C, P 34).

Nagtegaal and Belytschko are analogous art because they are both related to finite element analysis.

Therefore, it would be have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the calculation of stabilization matrix as taught by Belytschko for the method of controlling hourglass deformation of Nagtegaal because stabilization matrix is used to obtain elements which are of high accuracy (P. 5, first paragraph, lines 5-9).

Consider claim 4, 9 and 14, Belytschko discloses transforming the stabilization matrix from the initial element coordinate system (the coordinate system of stabilization matrix calculated) to global coordinate system before adding the terms of the stabilization matrix into global stiffness matrix (P48. "In order to add the element stabilization matrix to the global stiffness matrix, it must be transformed back to the global coordinate system").

Claims 5, 10, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagtegaal (U.S. Patent 6,044,210) in view of Hughes (Hughes, Thomas J. R.; "The Finite Element Method Linear Static and Dynamic Finite Element Analysis", 2000, Dover Publications).

Consider claim 5, 10 and 15, Nagtegaal discloses the method of claim 1, a software product of claim 6, and the machine-readable medium of claim 11.

Nagtegaal fails to disclose the solid element is chosen from the group consisting of three-dimensional 8-node hexahedral element, 6-node three-dimensional pentahedral element, two-dimensional 4-node plane strain element and two-dimensional 4-node axisymmetric continuum element.

Hughes discloses solid elements of three-dimensional 8-node hexahedral element (P. 123-125).

Therefore, it would be have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a solid element group consisting of three-dimensional 8-node hexahedral element as taught by Hughes for the method for controlling hourglass deformation of Nagtegaal because three-dimensional 8-node hexahedral element are the well-known structure of the solid element.

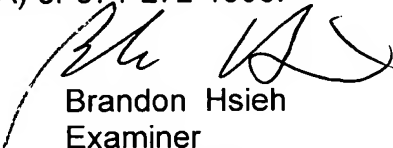
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brandon Hsieh whose telephone number is (571)-270-1320. The examiner can normally be reached on Monday-Friday, 7:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571)-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

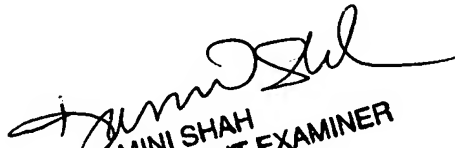
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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Brandon Hsieh
Examiner
Art Unit 2128

BH



KAMINI SHAH
SUPERVISORY PATENT EXAMINER